



Water Quality and the Future of Streams in Missouri

*Governor's Conference on Natural Resources
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Meramec River, MO

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Topeka shiner (FE)
Habitat degradation in Little Creek
Harrison Co., MO

What are the Problems?



LaBarque Creek
Jefferson Co., MO

Excessive
Sedimentation

Excessive Sediment: Nationwide Problem

Table 2. Leading Causes of Impairment in Assessed Rivers, Lakes, and Estuaries

Rivers and Streams	Lakes, Ponds and Reservoirs	Estuaries
Sediments/siltation	Nutrients	Metals
Pathogens	Metals	Nutrients
Habitat alterations	Organic enrichment	Organic enrichment

Rivers (miles)	3,692,830	695,540 (19%)	358,035 (51%)	27,750 (4%)	309,755 (45%)
Lakes (acres)	40.6 million	14,831,882 (37%)	7,073,207 (48%)	810,775 (5%)	6,947,901 (47%)
Estuaries (sq. miles)	87,369	30,446 (35%)	19,916 (66%)	694 (2%)	9,836 (32%)

Note: Percentages may not add up to 100% due to rounding.

Nutrient Pollution



Photo: Russ Gibson, Ohio Environmental Protection Agency

The National Rivers and Streams Assessment

2008-2009: A Collaborative Survey

www.epa.gov/aquaticsurveys

The National Rivers and Streams Assessment (NRSA) is a study of all rivers and streams of the U.S., from the largest “great rivers” to the smallest headwater streams. It was conducted using standard statistical survey techniques: sites were selected at random to represent the condition of all rivers and streams in regions that share similar characteristics. This is the first time a national monitoring study of the overall condition of streams and rivers has been conducted using this statistically-valid approach. State and tribal water quality agencies, with support from EPA, conducted this work using the same methods at all sites to ensure that results can be compared across the country.

Key Findings: Overall Biological Condition

- 55% of the nation’s river and stream miles do not support healthy populations of aquatic life, with phosphorus and nitrogen pollution and poor habitat the most widespread problems.
- 23% of river and stream miles are in fair condition.
- 21% are in good condition and support healthy biological communities.



Overall Biological Condition

Leading Problems: Nutrient Pollution and Habitat Degradation

- 40% of the nation’s river and streams miles have high levels of phosphorus. 27% have high levels of nitrogen.
- Biological communities are at increased risk for poor

Changes in Stream Condition

Compared to the findings of the 2004 Wadeable Streams Assessment, the NRSA found some significant changes in stream condition:



Other Problems...

Altered Hydrology

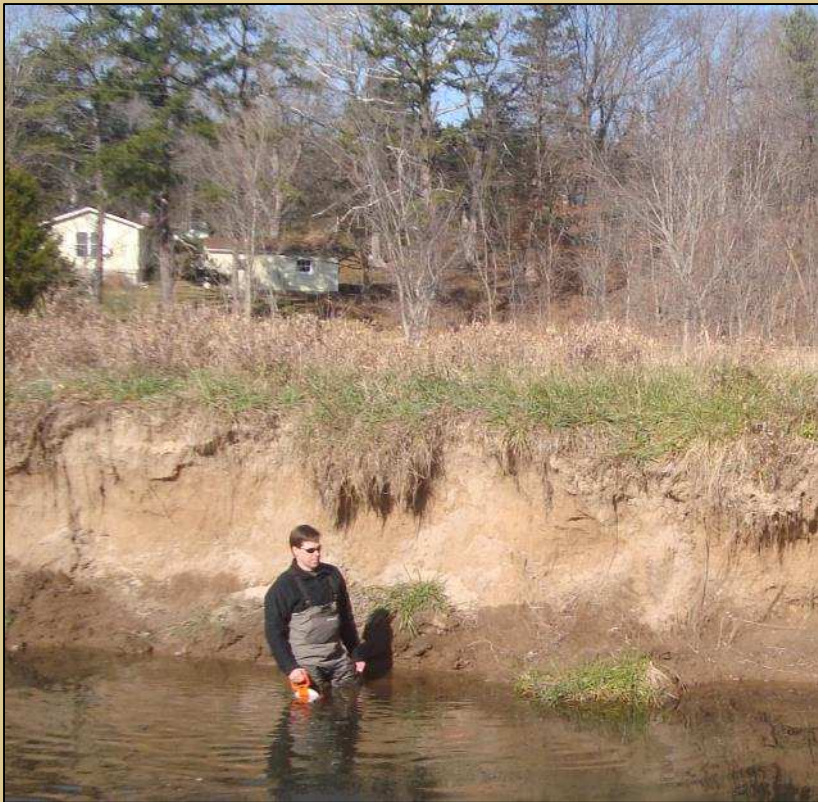


Altered Connectivity



Other Problems...

Altered Riparian Corridor



Altered Floodplains & Wetlands



Other Problems...

In-Stream Habitat Modification



Altered Stream Geomorphology

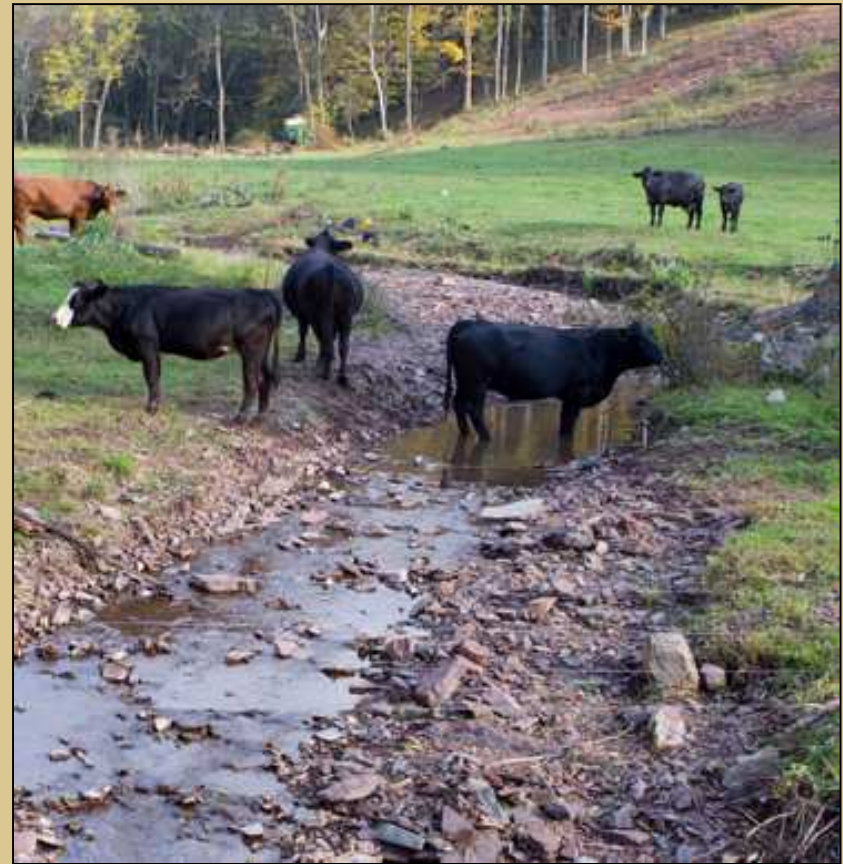


Other Problems...

Contaminated Sediments



Organic Pollution



What are the Sources of the Problems?



Missouri River, Kansas City, MO

Agriculture: Livestock & Crops



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Pathogens	Metals	Nutrients
Habitat alterations	Organic enrichment	Organic enrichment

Table 3. Leading Sources of Impairment in Assessed Rivers, Lakes and Estuaries

Rivers and Streams	Lakes, Ponds and Reservoirs	Estuaries
Agriculture	Unknown/unspecified*	Unknown/unspecified*
Unknown/unspecified*	Agriculture	Industrial discharges
Hydrologic modifications	Atmospheric deposition	Municipal discharges

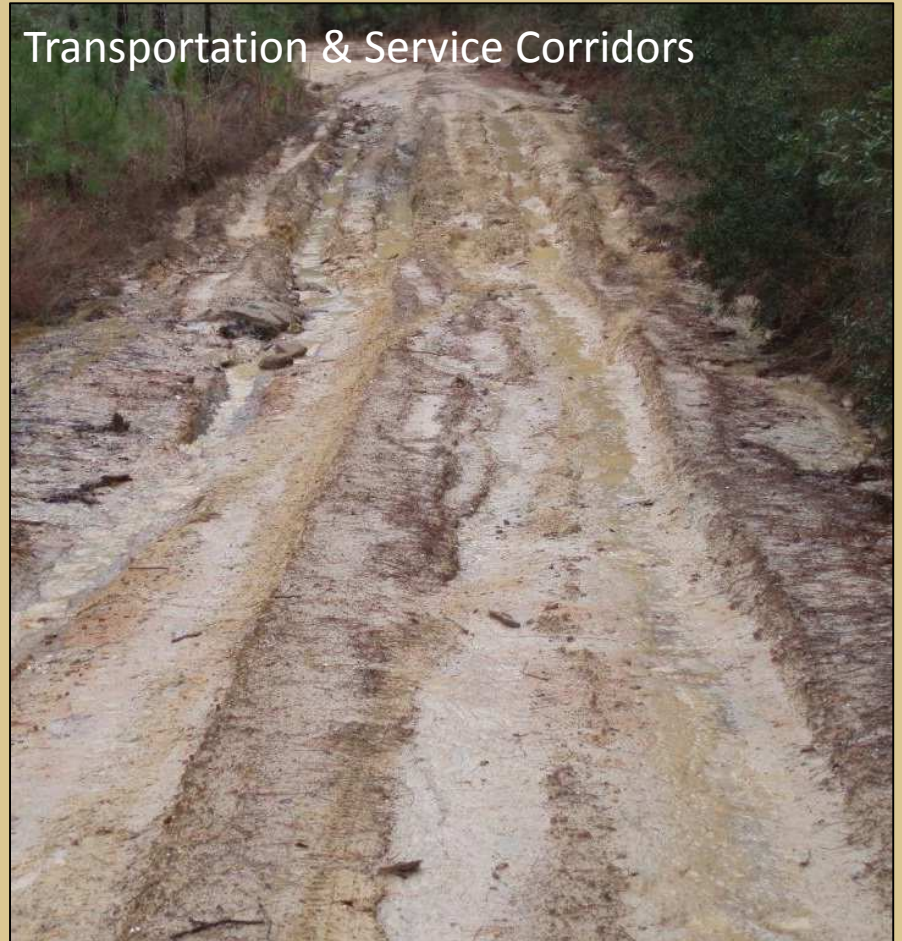


Residential & Commercial Development



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Other Sources...



Other Sources...

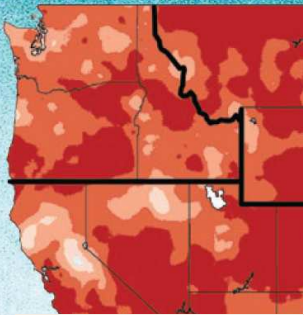


Pollution



Climate Change Impacts in the

18 MIDWEST



KEY MESSAGES

1. In the next few decades, longer growing seasons and rising carbon dioxide levels will increase yields of some crops, though those benefits will be progressively offset by extreme weather events. Though adaptation options can reduce some of the detrimental effects, in the long term, the combined stresses associated with climate change are expected to decrease

3. Increased heat wave intensity and frequency, increased humidity, degraded air quality, and reduced water quality will increase public health risks.

carbon is at risk from disruptions to forest ecosystems, in part due to climate change.

5. Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure.



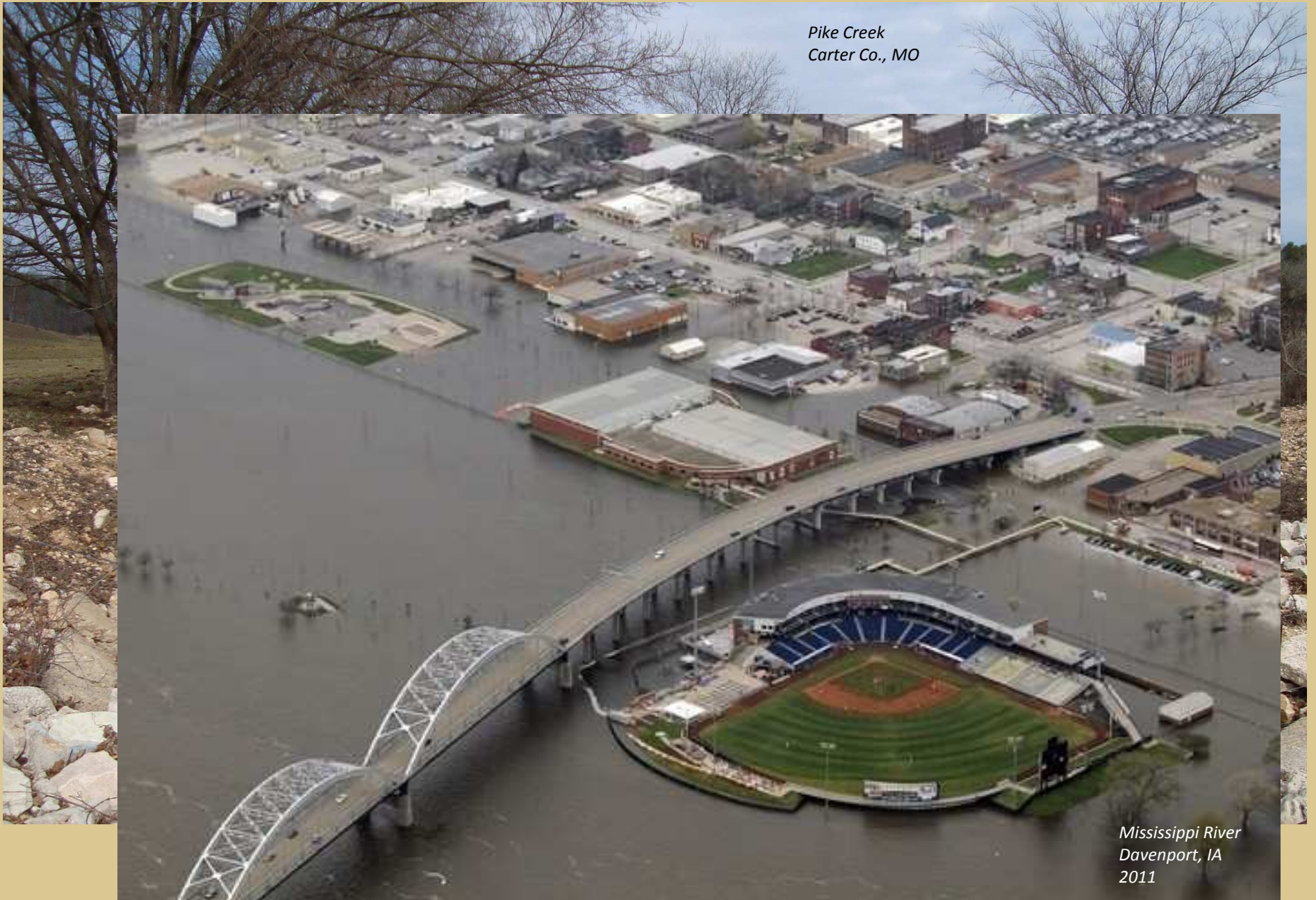
increasingly utilized potential to reduce emissions that cause climate change.

5. Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue, causing erosion, declining water quality, and negative impacts on transportation, agriculture, human health, and infrastructure.
6. Climate change will exacerbate a range of risks to the Great Lakes, including changes in the range and distribution of certain fish species, increased invasive species and harmful blooms of algae, and declining beach health. Ice cover declines will lengthen the commercial navigation season.

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*Pike Creek
Carter Co., MO*



*Mississippi River
Davenport, IA
2011*

Improving Water Quality & Conserving Missouri's Freshwaters



Mill Creek, Phelps Co., MO

Statewide: Updated State Water Plan

Missouri Department of

Natural Resources

“...long-range, comprehensive statewide program for the use of surface water and groundwater of the state, including:

- drinking water supplies,
- agriculture, industry,
- recreation,
- environmental protection
- and related needs.”

law's water monitoring, supply and use analysis, and planning obligations. The Water Resources Law also directs the department to ensure public participation in the development and revision of the state water plan and to create a [State Water Plan Interagency Task Force](#) to promote coordination among key state agencies. The [Missouri Drought Plan \(Revised 2002\)](#) is an example of statewide water planning and interagency collaboration aimed at serving the needs of Missourians. The Water Resources Law also directs the department to prepare an annual report ([Missouri Water Resources Law 2004 Annual Report](#)) that describes the progress the department has made in fulfilling the objectives of the Water Resources Law.



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Kansas Water Plan 2014

The Kansas Water Office, in coordination with local, state, federal and interstate partners, is developing the 5-year update of the *Kansas Water Plan*. The *Kansas Water Plan* is one of the primary tools used by the State of Kansas to address current water resources issues and to plan for future needs. Statutory authority and basic guidance for formulating the *Kansas Water Plan* is contained in the State Water Resources Planning Act.

[Kansas Water Plan \(2009\)](#)

As volumes of the 2014 Plan are drafted, they will be linked below.

EXECUTIVE SUMMARY

VOLUME I - [INTRODUCTION & BACKGROUND](#) [PDF](#)

VOLUME II - STATEWIDE WATER ASSESSMENT

Sections will be added as they are completed. Please note that hyperlinks will not be active until the document is final.

- [Water Budget of Kansas - Draft](#)
- [Water Demand - Municipal Water Demand - Draft](#)
- [Water Demand - Industrial Water Demand - Draft](#)
- [Water Demand - Irrigation Water Demand - Draft](#)
- [Water Demand - Stockwater Demand - Draft](#)
- [Water Demand - Recreation - Draft](#)
- [Water Supply - Groundwater Sources and Supply - Draft](#)
- [Water Supply - Surface Water Supply - Draft](#)
- [Water Supply - Non-Traditional Sources and Uses of Water Reuse - Draft](#)
- [Water Supply - Surface Water Quality - Draft](#)
- [Water Supply - Assessment of Infrastructure Condition and Needs - Draft](#)

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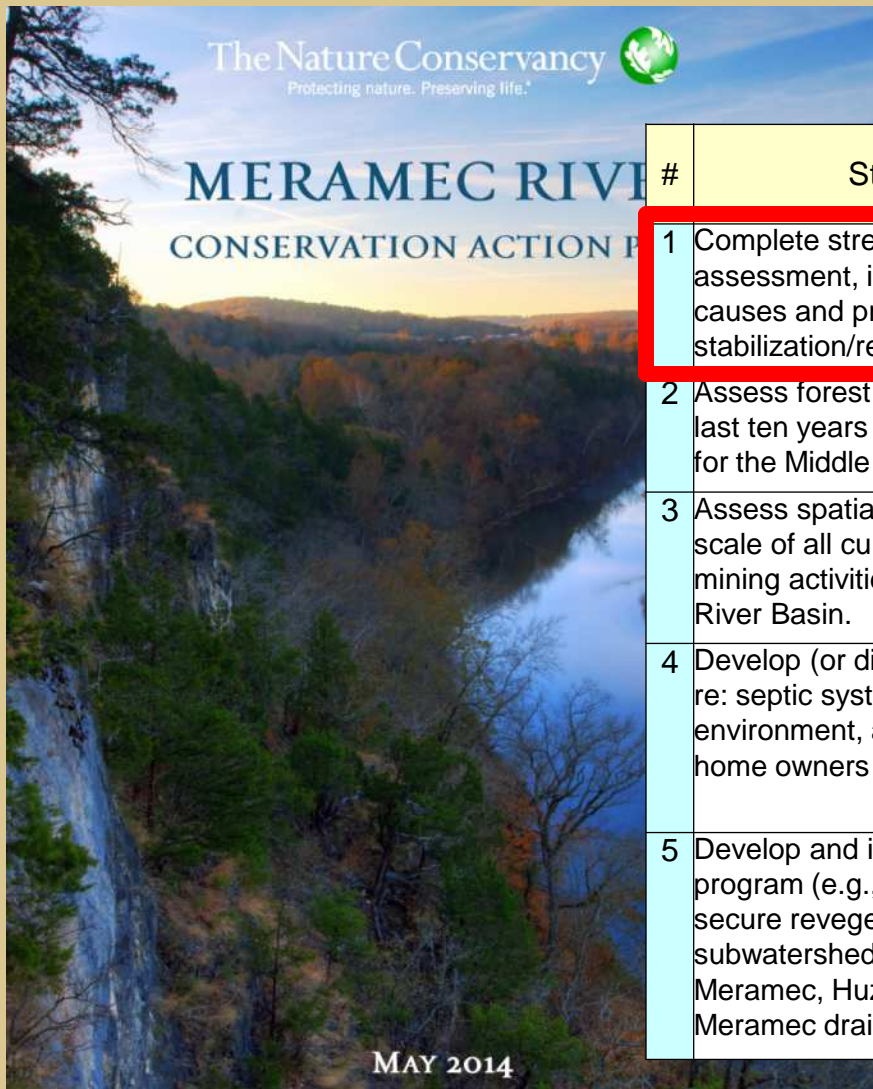
For more information, please contact the E-mail address for comments on arkansaswater@co.arkansas.gov

Point of contact: [Name], Arkansas [Title], Resources Commis

Basin Scale: Getting Answers & Focusing Work



Basin Scale: Getting Answers & Focusing Work



#	Strategic Actions	Overall Rank	Benefits	Feasibility	Cost
1	Complete streambank stability assessment, including identification of causes and prioritization for stabilization/restoration.	Very High	Very High	High	High
2	Assess forest conversion rate over the last ten years using GIS/aerial analyses for the Middle Meramec River Drainage.	High	High	Medium	Medium
3	Assess spatial distribution, scope, and scale of all current in-stream gravel mining activities throughout the Meramec River Basin.	High	High	High	Medium
4	Develop (or distribute current) a brochure re: septic system maintenance, effects on environment, and solutions, targeted at home owners and developers.	High	High	Medium	Medium
5	Develop and implement partnership program (e.g., Woodlands for Wildlife) to secure revegetation for key subwatersheds in the Bourbeuse, Upper Meramec, Huzzah/Courtois, and Middle Meramec drainages	High	Very High	Medium	Very High

Basin



3) Pollutant Load Reductions

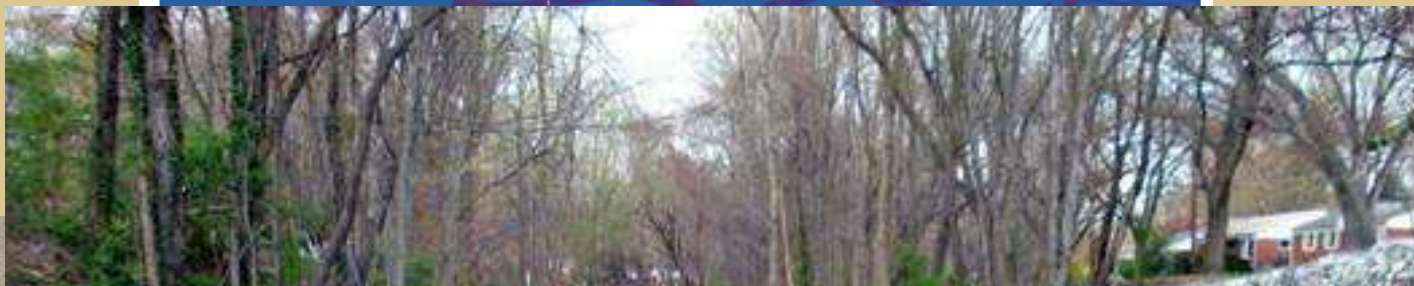
Table 72. Cropland Erosion Load Reduction in the Dry Fork Sub Watershed.*

Dry Fork Creek Annual Soil Erosion Reduction									
Year	No-Till	Cover Crops	Nutrient Mgmt Plan	Cons Crop Rotation	Grassed Waterways	Terraces	Vegetative Buffers	Water Retention Structures	Total
1	89	12	30	30	48	36	59	59	363
2	178	24	59	59	95	71	119	119	725
3	268	36	89	89	143	107	178	178	1,088
4	357	48	119	119	190	143	238	238	1,451
5	446	59	149	149	238	178	297	297	1,813
6	535	71	178	178	285	214	357	357	2,176
7	624	83	208	208	333	250	416	416	2,539
8	713	95	238	238	381	285	476	476	2,901

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Figure 22. Spring River Watershed Catchment Scale Targeted Areas

All sediment, phosphorus and nitrogen SWAT generated maps for each sub watershed in the Spring River Watershed are provided in the Appendix.



Trail Creek, CO




Reduced Sedimentation
&
Ecological Benefits



**Tippecanoe River
2 Stage Ditch Demonstration Site**

*"Improving the function of Agricultural Drainage Ditches"
reduced sedimentation, lower maintenance cost,
and a better quality of water*

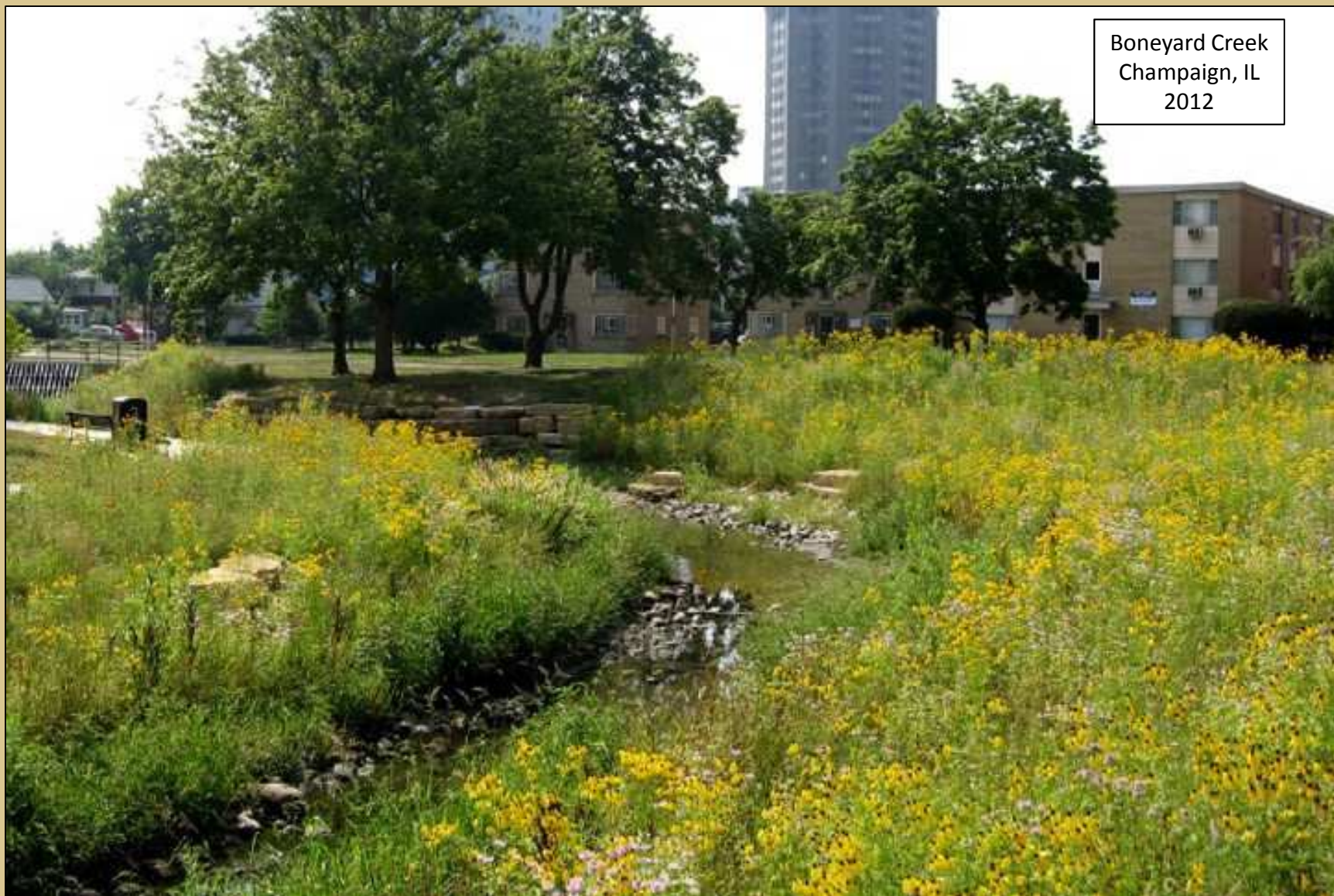
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Kosciusko County Surveyor/Drainage Board
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Boneyard Creek
Champaign, IL
2005

Boneyard Creek
Champaign, IL
2012





Mill Creek, Phelps Co., MO